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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/779,749	02/18/2004	Yoshihiro Kimura	H6808.0040/P040	2045

24998 7590 02/23/2006

DICKSTEIN SHAPIRO MORIN & OSHINSKY LLP
2101 L Street, NW
Washington, DC 20037

EXAMINER	
JOHNSTON, PHILLIP A	

ART UNIT	PAPER NUMBER
2881	

DATE MAILED: 02/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/779,749	KIMURA ET AL.	
	Examiner	Art Unit	
	Phillip A. Johnston	2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 December 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Detailed Action

1. This Office Action is submitted in response to amendment dated 12-2-2005, wherein claims 1,2, and 10-11 have been amended. Claims 1-11 are pending.

2. The examiner has further construed the claims in light of applicants definition of the term concave in paragraph [0040] of the published specification, which states; FIG. 1 shows an SEM image in which the result of the concavity/convexity determination has been incorporated. An upper portion 101 of the rectangular line at the bottom of the image corresponds to a line (convex) portion, while a lower portion 102 corresponds to a space (concave) portion.

This description corresponds effectively to the Webster collegiate dictionary definition of concave as: arched in : curving in -- used of the side of a curve or surface on which neighboring normals to the curve or surface converge and on which lies the chord joining two neighboring points of the curve or surface. As a result, the § 112 first paragraph rejection, of the office action mailed on 6-2-2005, is hereby withdrawn.

Claims Rejection - 35 U.S. C. 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-11 stand rejected under 35 U.S.C. 102 (b) as being clearly anticipated by Archie, U. S. Patent No. 5,969,273.

Archie (273) discloses the following;

(a) Using a commercially available SEM to perform an e-beam scan across a resist line (convex pattern); forming a profile waveform of escaped electrons (secondary and reflected electrons), having a peak, as recited in claims 1-4, and 11. See Column 5, line 43-67; Column 6, line 1-33; Figures 6A, 6B, and 7 below.

FIG. 6A

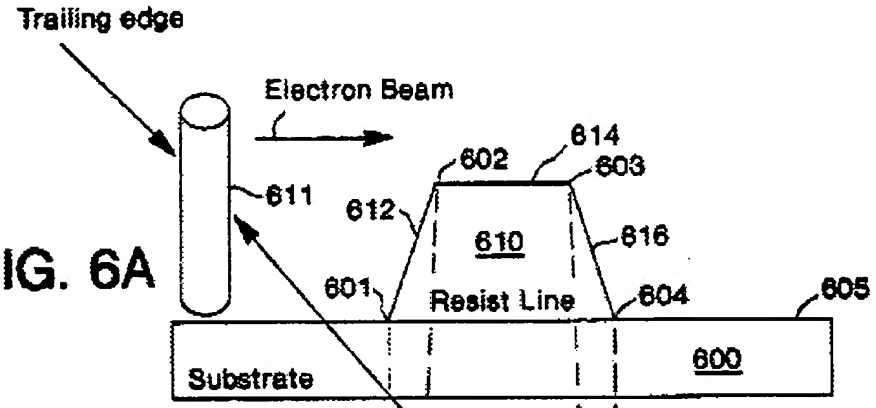
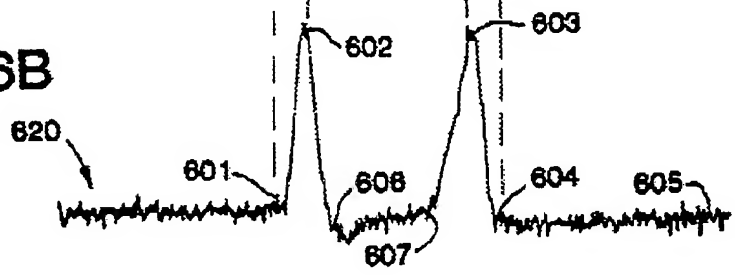


FIG. 6B



It is important to point out here that as the width of the resist line 610 becomes smaller, a single peak representative of the line width occurs as shown in applicants Figure 3C above.

(b) A waveform peak 702, which has steeply sloped regions on either side and one side slopes more steeply to the bottom (foot portion) than the other, where the waveform shape 700 is representative of the resist line (a convex feature). the regions

adjacent the peak regions; i.e., from 701 to 702, and 705 to 706, are regions where the secondary electron signal amplitude is increasing sharply over the baseline amplitude of the substrate, which are equivalent to regions 303S and 303L in applicants Figure 3C above, as recited in claims 1-4, and 11. See Column 6, line 9-33.

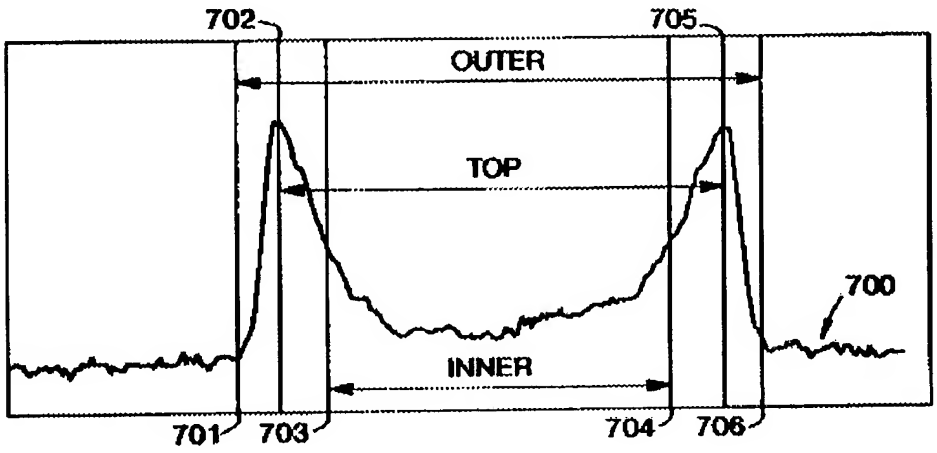


FIG. 7

(b) The use of maximum slope to define the dimensions of a feature, and determining feature dimensions relative to a stored threshold value, as recited in claims 5-9. See Column 5, line 43-67; Column 6, line 1-33;

(c) One of ordinary skill recognizes that the locations of the points 701-706 may be determined by computing the derivative of the waveform 700, to determine the slope, and selecting the points at which the difference between the slope and the maximum slope reaches a threshold value, as recited in claim 10. See Column 6, line 23-33.

Examiners Response to Arguments

5. Applicant's arguments filed 12-2-2005 have been fully considered but they are not persuasive.

Argument 1

Applicant states that "The present invention relates to methods and apparatus for determining the concavity and convexity of line and space patterns formed on a sample. Archie, on the other hand, relates to determining the critical dimensions of a featured formed on a substrate using, for example, the edge width of the feature. Archie provides no teaching or suggestion relating to distinguishing between a line portion and a non-line portion in a situation where a plurality of lines are arranged, namely, Archie provides no teaching regarding determining concavities and/or convexities in a situation where concave and convex portions are repeated, as in the present invention.

In other words, Archie provides no teaching or suggestion to apply the concept of "comparing a convergence of foot portions" between peaks to each of a plurality of peaks of a detected profile waveform. For at least these reasons, Archie does not anticipate or render obvious the claimed invention."

The applicant is respectfully directed to the applicants published specification, Figure 1 below; and paragraph [0040], which states; Evaluation values can be calculated for the left and right sides of the center at the peak vertex of the profile, using the intervals 405S and 405L of the differentiated profile of FIG. 4 relative to the respective zero points, and the larger evaluation value (the peak with a wider foot) is

determined as corresponding to the line. This can be conducted for all of the peaks of the profile, thus determining the concavities and convexities of the pattern in the image. FIG. 1 shows an SEM image in which the result of the concavity/convexity determination has been incorporated. An upper portion 101 of the rectangular line at the bottom of the image corresponds to a line (convex) portion, while a lower portion 102 corresponds to a space (concave) portion. This line exists only in terms of image processing and does not indicate any changes imparted to the object under investigation. By comparing with the image 304 of FIG. 3, it will be seen that the determination has been correctly done.

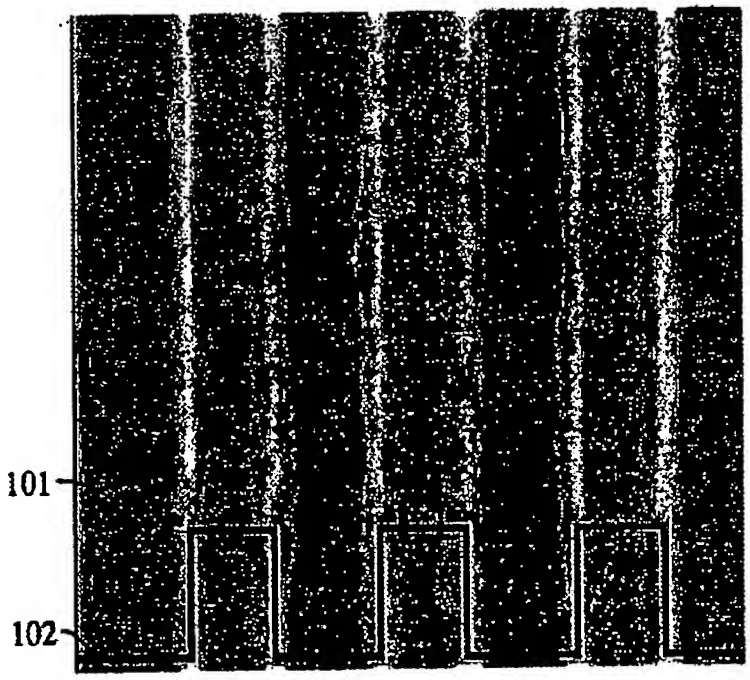


FIG. 1

The applicant is also respectfully directed to Archie (273), Figure 7 below; and Column 6, line 9-27, which states; FIG. 7 shows another SEM trace 700 of a line

illustrating the "humpwidth." In SEM trace 700, there are two maxima or top points 702 and 705, which correspond to the vicinity of the two top edges of the line. On either side of each the two top points 702 and 705, there is a steeply sloped region of the waveform. If small, high frequency noise components of the waveform 700 are filtered out or ignored, the magnitude of the slope is greatest in the regions on either side of the two top points 702 and 705. Points 701 and 706 in waveform 700 correspond to the vicinity of the bottom corners where the feature meets the substrate. The remaining two points 703 and 704 (referred to herein as "inner points") are the points where the absolute value of the slope of the waveform begins to decrease from the maximum value near the top points 702 and 705. One of ordinary skill recognizes that these points may be determined by computing the derivative of the waveform 700, to determine the slope, and selecting the points at which the difference between the slope and the maximum slope reaches a threshold value.

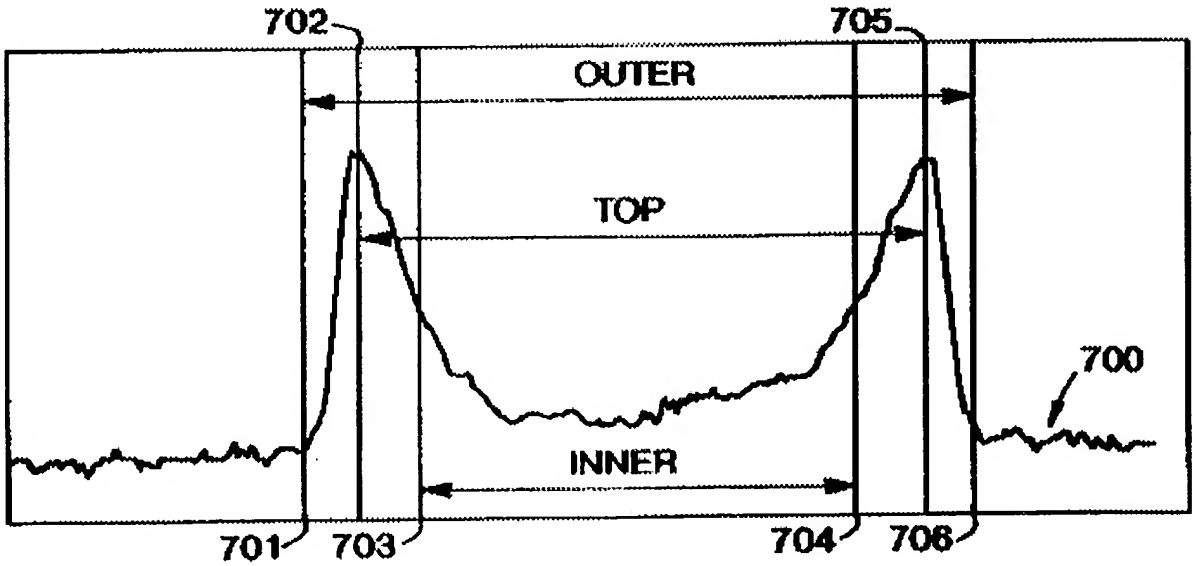


FIG. 7

The examiner has interpreted from the Archie (273) references above that points 701 and 706 in Figure 7 define the edges of the "space" portion of the pattern; i.e. points 701 and 706 define the lines edges (beginning and ending of the line portions respectively). That portion of the waveform where the magnitude of the slope is greatest; i.e., continuous in the regions on either side from 701 to top point 702, and from 706 to top point 705, define concave portions. While that portion of the waveform where the absolute value of the slope of the waveform begins to decrease from the maximum value (converges more gradually); i.e., from top point 702 to 703 and from top point 705 to 704 define convex portions. In addition, these portions are defined by comparing differences in their slopes, precisely as recited in the claimed invention.

Conclusion

6. The Amendment filed on 12-2-2005 under 37 CFR 1.131 has been considered but is ineffective to overcome the Archie (273) references.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

7. Any inquiry concerning this communication or earlier communications should be directed to Phillip Johnston whose telephone number is (571) 272-2475. The examiner can normally be reached on Monday-Friday from 6:30 am to 3:00 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiners supervisor John Lee can be reached at (571) 272-2477. The fax phone number for the organization where the application or proceeding is assigned is 571 273 8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

PJ
February 10, 2006

JOHN R. LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800